REMARKS

Claims 1-3 and 6-12 are pending. By this Amendment, claims 1 and 7 are amended and claims 4 and 5 are canceled.

An Information Disclosure Statement was filed on December 16, 2005. It is requested that the Examiner consider the references cited in that Information Disclosure Statement and return an initialed Form PTO-1449 to Applicants' representative.

A Restriction and an Election Species Requirement was asserted and Applicants elected Group I and Fig. 9. Claims 1-3 and 7-12 read on the elected group and species. Applicants request rejoinder of claim 6 when claim 1 is allowed because claim 1 remains generic to claim 6. Applicants reserve the right to file one or more divisional applications based on non-elected claims 4 and 5.

Japanese Patent Application No. 2004-028470, filed February 4, 2004, was allegedly not received. Applicants enclose the first two pages of the certified copy and the July 6, 2004 date stamped receipt indicating filing of the certified copy. It is requested that the Examiner acknowledge receipt of the certified copy in the next Office Action.

A substitute Declaration will be filed shortly in response to the objection to the Declaration.

Claims 1-3 and 11 were objected to because "holes" instead of "voids" was used. However, the use of "holes" is correct as consistent with the specification. It is respectfully requested that the objection be withdrawn.

Claims 1-3 were rejected under 35 U.S.C. §103(a) over JP-A-9-097637 (JP '637), and claims 7-12 were rejected under 35 U.S.C. §103(a) over JP '637 in view of Sakuraba et al. (Sakuraba), U.S. Patent No. 5,623,240. The rejections are respectfully traversed.

JP '637 and Sakuraba fail to disclose or suggest an oxide superconductor current lead in which metallic electrodes are provided at both sides of a rare-earth based oxide

superconductor manufactured by a melting method, joining metal is provided at joint portions formed by the oxide superconductor and the metallic electrodes, and the oxide superconductor and the metallic electrodes are joined by the joining metal, wherein a volume of holes in the joining metal provided at the joint portions is 5% or less of a volumetric capacity of the joint portions, as recited in claim 1.

Page 4 of the Office Action asserts that it would have been obvious to use the structure of claim 1. This is not correct because JP '637 fails to consider holes formed in joint portions.

By using a rare-earth based oxide superconductor manufactured by a melting method as an oxide superconductor, a current of 1000 A or more is actually fed through the joint portions and the resistance value is measured. JP '637 fails to provide any disclosure with regard to energizing current capacity. However, it appears that JP '637 can only use, at most, a current of only about 200 A. JP '637's examples show that Bi2212 manufactured by a CO_2 laser melting method is used as an oxide semiconductor. Here, the energizing current capacity is estimated to be 2000 A/cm^2 × 0.1 cm^2 = 200A at most, from the points that a critical current density (Jc) in 77 K of Bi2212 manufactured by the melting method is usually 2000 A/cm^2 or less at most, and a sectional area of the oxide superconductor that can be manufactured by a CO_2 laser is about a 0.1 cm^2 at most from the viewpoint of heat conduction.

Accordingly, JP '637, independently of whether holes are included in a solder of the joint portions, the resistance value of the joint portions show a low value. Therefore, in JP '637, the holes formed in the joint portions are not required to be taken into consideration. JP '637 thus fails to provide any disclosure about holes formed in the joint portions.

Conversely, the features of claim 1 allow the current of 1000 A or more to be fed through the joint portions, the resistance value is measured, and the holes of the joint portions

are reduced as a result. Accordingly, the combination of features recited in claim 1 are not obvious based on JP '637 where the holes formed in the joint portions are not taken into consideration.

Page 4 of the Office Action asserts that the joint portions show a low resistance value in JP '637. However, resistance values vary in accordance with the measuring method.

When a solder of joint portions has holes, the current runs through a part other than the holes. Accordingly, when there is a low current capacity running through the joint portions, even if a solder part of the joint portions has holes, an electrical resistance value of the joint portions remains low. However, when the current capacity is increased, a current running passage becomes insufficient with only the solder part between the holes, thereby increasing the resistance value. Specifically, with the increase of the current capacity, the resistance value is also increased.

JP '637 also fails to suggest all the features recited in claim 1. When a large current is fed through the joint portions by using a Y123-based molten material as a superconductor, heat generation occurs at the joint portions. Therefore, a contact resistance value at an interface between the oxide superconductor and a metallic electrode is measured in detail, and the interface between the oxide superconductor and the metallic electrode is decomposed. Based on studies over the entire surface, it is found that there are holes in a joining metal of the interface between the oxide superconductor and the metallic electrode, wherein a volume of holes in the joining material provided at the joint portions is 30% or more of a volumetric capacity of the joint portions. Furthermore, by the combination of features recited in claim 1, the heat generation can be suppressed, even when a large current is fed through the joint portions, by forming the holes in the metal for joining, with the volume set at 5% or less of the joint portions.

Conversely, according to JP '637, the holes formed in the joint portions are not required to be taken into consideration. Accordingly, JP '637 fails to provide any disclosure about the holes formed in joint portions.

JP '637 is realized only when the current capacity arranged therethrough is low, whether the superconductor is a Y-based superconductor or the Ta-based superconductor.

Accordingly, the combination of features recited in claim 1 are not obvious based on JP '637, but instead achieves a drastic effect of suppressing the heat generation while allowing a large current to run through the joint portions, with a new structure in which the volume of holes in the joining metal provided at the joint portions is 5% or less of a volumetric capacity of the joint portions.

JP '637 also fails to disclose or suggest all of the features recited in claim 7. As discussed above, JP '637 fails to suggest all of the features recited in claim 7. Furthermore, the current lead described in Sakuraba fails to disclose the structure of claim 7.

It is respectfully requested that the rejections be withdrawn.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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JAO:SMS/sxb

Attachments:
Petition for Extension of Time
Copy of first 2 pages of JP 2004-028470
July 6, 2004 date stamped receipt

Date: April 10, 2006

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